

Myiasis in a Neglected Elderly: Urgent Action Needed in South America

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Background: Myiasis is an infestation by fly larvae. Some species exclusively affect humans, contaminating wounds, mucous membranes, and other tissues. It is a disease with marked socioeconomic connotations.

Case Presentation: The current case involves a 95-year-old woman, an inhabitant of the Andean region of Ecuador with a history of resection of basal cell carcinoma in the left zygomatic region and a diagnosis of chronic leukemia. The surgical wound was secondarily infested with *Cochliomyia hominivorax* fly larvae and the patient was readmitted to the hospital to treat this complication. A marked clinical improvement was observed after surgical debridement, removal of larvae and administration of ivermectin and antibiotics.

Conclusion: The determinants of this infestation were advanced age, neglect, and destitution in a patient with an open wound on the face after resection of a basal cell carcinoma. This case illustrates the appalling reality of the marginalized and excluded population of South America. Also of concern is the expansion of myiasis-producing fly populations to areas outside their natural humid and warm habitat. South American governments are called upon to act jointly and effectively against this ominous disease.

Keywords: *C. hominivorax* larvae, infestation, Andean region, marginalized population

Introduction

The term myiasis was coined by the English entomologist Frederick William Hope in 1840 by merging the Greek word “Myia” meaning fly and the suffix “asis” which can be translated as “used to designate diseases”.¹ The term myiasis is defined as the infestation of tissues of living organisms, both human and animal, by dipteran larvae, which require a protein-rich food source in their larval stage to develop into adult flies.² The species of myiasis-producing flies according to their relationship with the host are grouped as follows: (a) obligate producers of myiasis. Parasites depend on the host to complete their life cycle and usually parasitize only living organisms. This is the case, for example, of *Cochliomyia hominivorax*, *Dermatobia hominis* and *Gasterophilus intestinalis*.; (b) Facultative myiasis-producers. Normally free-living but may feed on decaying matter or necrotic tissues, e.g., *Sarcophaga* spp. and (c) Those that produce myiasis accidentally, also called false myiasis, when free-living larvae are ingested or inhaled. Myiasis is also classified depending on the anatomical site affected as cutaneous (the most frequent), ophthalmic, auricular, buccal, nasal, intestinal, etc.³

At least 20 species of flies have been identified whose life cycle includes a biophagic larval stage capable of producing myiasis in humans and animals.⁴ Two species have been found in the Americas, with a wide predominance in the tropical and subtropical regions of the continent: *Cochliomyia hominivorax* (new world screwworm fly, NWSF) and *Dermatobia hominis* (botfly). After decades of suppression and eradication campaigns by means of sterile insect technique (SIT), the most harmful of these species, *C. hominivorax*, has been virtually eliminated in the USA and Central America,⁴⁻⁶ but not in South America, where a coordinated campaign with the participation of all the

governments of the region has been lacking for the eradication of these flies capable of producing myiasis not only in animals but also in humans.

As previously stated, *C. hominivorax* and *D. hominis* show differences in the pattern of involvement. While *C. hominivorax* infests open wounds or natural anatomical orifices/cavities (mouth, nose, ear, etc.), *D. hominis* is the main cause of furuncular myiasis.⁷

Regardless of the agent and the type of lesion produced, human infestation occurs predominantly in susceptible populations whose common factors are illiteracy, poor sanitation, lack of personal hygiene, alcoholism, drug addiction, extreme age, cancer, mental disability, etc.⁸ It is, therefore, a neglected ectoparasitic zoonotic disease with a deep-rooted socioeconomic origin. The lack of concerted preventive action by all South American governments, together with the phenomenon of increasing marginalization and extreme poverty affecting slum dwellers and other disadvantaged sectors of the population, has made myiasis a serious public health problem in the region.

This report describes the dramatic case of an elderly patient with myiasis infesting a surgical wound on her face following the removal of a basal cell carcinoma. In addition to her advanced age, her clinical condition was aggravated by an underlying chronic leukemia and, above all, by her vulnerable situation due to destitution and neglect.

Case Presentation

The patient was a 95-year-old woman with a history of basal cell carcinoma in the right zygomatic region, which was surgically removed. She subsequently received radiotherapy for local recurrence. In addition, the patient was under palliative treatment and follow-up for an underlying chronic lymphoid leukemia. The patient presented to the emergency department of the José Carrasco Arteaga Hospital, Cuenca, Ecuador, for a history of increasing pain, pruritus and discharge in the right zygomatic region of a few days of evolution. On physical examination she was in regular general condition, conscious and oriented all three spheres; BP: 110/70, heart rate: 110 bpm, respiratory rate: 20 rpm, temperature: 38°C. A 5×5 cm cavitated lesion with necrotic margins surrounded by edematous hyperemic skin was observed in the right zygomatic-malar region with necrotic margins with foul-smelling purulent discharge and apparent bone involvement (Figure 1). Upon simple inspection, numerous fly larvae were observed embedded at the bottom of the skin cavity. The ipsilateral eye showed conjunctival injection and yellowish discharge.

The patient was readmitted with the diagnosis of myiasis, facial cellulitis and conjunctivitis for administration of intravenous antibiotics and antiparasitic treatment with ivermectin. Surgical debridement was performed with removal of all larvae, whose macroscopic taxonomic characteristics matched those of *Cochliomyia hominivorax* (Figure 2). Improvement of the lesion under inpatient treatment was observed in the following days (Figure 3). Plastic surgical repair of the cavitated lesion was considered as most probably unsuccessful due to advanced age, increased surgical risk, history of basal cell carcinoma, underlying chronic leukemia and overall poor mid-term prognosis.

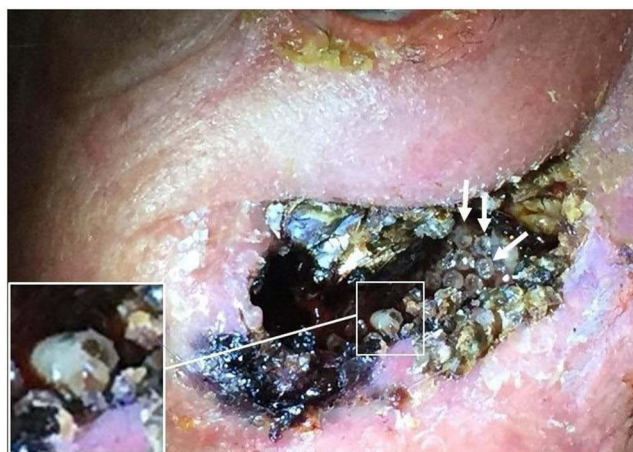


Figure 1 View of the cutaneous cavity defect in the zygomatic region. Larvae can be seen embedded in the posterior wall of the cavity (arrows). In the inset, the image of a partially extruded larva at the bottom of the lesion has been zoomed in. The posterior spiracles can be clearly discerned.

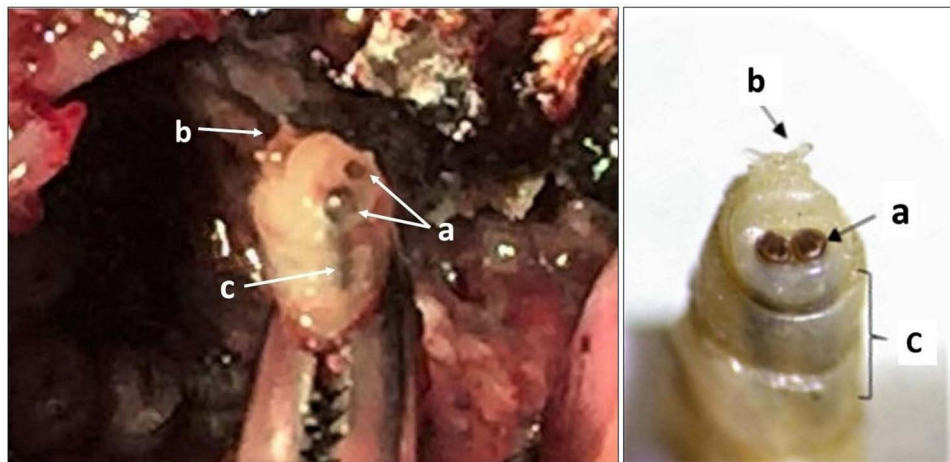


Figure 2 Larva of *Cochliomyia hominivorax* being removed from the lesion with hemostatic forceps (left panel). Some of its taxonomic features can be identified: (a) the posterior spiracles, (b) the anal tubercles, and, in particular, (c) the pigmented tracheal trunks, which are the hallmark of this larval species. For comparison, (right panel) an image of a *C. hominivorax* larva is shown. Adapted from Páez-Díaz Ruth, Villa-Arteta Luisa C. Identification of myiasis-producing larvae from the Universidad Colegio Mayor de Cundinamarca. NOVA. 2022;15(28). Available from: <https://revistas.unicolmayor.edu.co/index.php/nova/article/view/571/940>. Open Access.²³



Figure 3 Appearance of the cutaneous lesion on 12th day of inpatient treatment.

Discussion

South America is an endemic area for myiasis, with cases from most South American countries having been earlier reported in the medical literature. In Argentina and Chile, the larva of the dipteran *C. hominivorax* has been identified as a common cause of infestation in humans and animals.⁹ The larvae of this fly species were also detected in Venezuela in a total of 241 cases of myiasis throughout the country, including older adults and children, over an 8-year period, according to official data.¹⁰ In Colombia, a dramatic case of myiasis in the umbilical cord of a 7-day-old child caused by *C. hominivorax* larvae was reported¹¹ and, in another case study, *C. hominivorax* larvae were isolated from the scalp abscesses of a 7-year-old girl with pediculosis.¹² In Brazil, *C. hominivorax* was identified as the most frequent biological agent in cases of myiasis treated in a hospital in Rio de Janeiro.¹³ Larvae of other fly species such as *Cochliomyia macellaria* (Fabricius), *Dermatobia hominis*, and

Chrysomya albiceps were also identified as causing myiasis in Brazil, but much less frequently. In northern Peru, *Dermatobia hominis* and *C. hominivorax* are the predominant species found in most cases of myiasis.¹⁴

In Ecuador, Calvopina et al¹⁵ found in the National Automated Registry of External Medical Consultations of the Ministry of Public Health of Ecuador a total of 2187 cases of myiasis recorded between 2013–2015, 46% diagnosed in the Pacific coastal region, 30% in the Andean region and 24% in the Ecuadorian Amazon, which would confirm that myiasis is an endemic disease in all Ecuadorian geographic regions. Unfortunately, only clinical information was available in the National Register, but no taxonomic data. Therefore, to fill this information gap, the authors also reviewed 34 case reports of myiasis in Ecuador published in indexed and non-indexed journals comprising 39 patients, 24 of them male (61.5%), ranging from infants to the elderly aged 90 years. *D. hominis* larvae were identified as the cause of furuncular lesions in patients from the Pacific coast and Amazon regions of the country, while *C. hominivorax* was found to be the main cause of myiasis in wounds and cavitary lesions of the ocular orbits, nose, ears, and vagina in patients from the humid and warm areas of the coast and subtropics up to the temperate Andean region. Most of the Ecuadorian Andean region is located at an altitude of more than 2000 meters above sea level, which in principle would not be the best environment for myiasis-producing fly species, whose larvae need temperatures between 20°C and 30°C to survive. In fact, the patient of the current report is an inhabitant of the Canton of Gualaceo in the Province of Azuay, located at 2380 m above sea level at the heart of the Ecuadorian Andean region (Figure 4). This would suggest a progressive expansion of the distribution area of *C. hominivorax*, which is of great concern because of the negative impact it poses on the health of humans and animals. Some authors blame global warming as the most likely culprit for the trend toward the spread of *C. hominivorax* and, eventually, other myiasis-producing species.¹⁶ In February 2020, the Ecuadorian Agency for Phyto- and Zoosanitary Regulation and Control approved the catalog of notifiable diseases for all animal species, including myiasis caused by *C. hominivorax*.¹⁷ However, myiasis is not yet in the list of Obligatory Notifiable Diseases of the National Directorate of Epidemiological Surveillance of the Ministry of Public Health of Ecuador.¹⁸



Figure 4 Geographical location of the Canton of Gualaceo in the Province of Azuay, Republic of Ecuador, South America.

Autochthonous cases of myiasis are practically non-existent in Europe, Japan, the United States and Canada. Sporadic cases of myiasis have been reported in nationals of these countries following travel to endemic regions of Central and South America.^{19–21}

Calvopina et al,¹⁵ in their literature review of all cases of myiasis in which infestation had occurred in Ecuador, found 8 reports of tourists who contracted myiasis after traveling to highly endemic areas of the country. The remaining 31 reports were from Ecuadorian residents, 16 of them rural dwellers. Predisposing conditions included alcoholism, males, malnutrition, low socioeconomic status, distitution, psychiatric illness, and advanced age.

The notable underreporting of myiasis cases in our country is not only attributable to the lack of mandatory reporting of such cases to the ministerial epidemiological registry, but also to the fact that most of the cases that occur in native indigenous communities in the Amazon region and other rural areas of Ecuador are usually treated by tribal healers (*shamans* in Kichwa language) with ancestral or empirical remedies. In addition, self-medication is a common practice in the country. Many prescription-only medications may be freely purchased without a doctor's prescription.²² As shown in the present case, larval removal, surgical debridement, antibiotics, and oral or topical treatment with ivermectin remain the gold standard in the treatment of myiasis.

Conclusion

The clinical and social profile of the patient described in the current report does not represent an isolated case. Fly spraying campaigns and treatment of affected patients will only be a drop in the ocean as long as effective preventive measures such as fly eradication by environmentally friendly insect control methods are not taken. Only with close and concerted intergovernmental cooperation is it possible to eradicate *C. hominivorax*, prevent reinvasion of the fly from a neighboring country and thus achieve a truly maggot-free state in South America. Myiasis should be included in the list of notifiable diseases and the causative larval species should be routinely identified entomologically. Last but not least, educational, socioeconomic and health conditions of the population at risk, especially the elderly, should be improved.

Summary

The current report is intended to raise awareness of myiasis, which is an infestation caused by fly larvae that is affecting underprivileged sectors of communities in developing countries, particularly in South America. The real impact of the problem in terms of the number of patients affected has not been estimated because there is a notable underreporting of this parasitic disease. The present case is paradigmatic of the situation of many patients with this condition who are almost always individuals in a state of extreme poverty and neglect. Prevention is necessary and can only be achieved with a comprehensive approach to the problem, including insect sterilization techniques, with the participation and cooperation of all South American governments to eradicate the causal agents of myiasis and also its predisposing factors.

Ethics Statement

The local Human Research Ethics Committee (CEISH) determined that the current research did not involve any risk of harm or breach of confidentiality to the patient. According to Ecuadorian Ministry of Health regulations, CEISH approval is not required for case reports or the publication of anonymized patient data.

Informed Consent

Verbal consent for publication of clinical data and photos was obtained from the patient, witnessed by a representative of the Human Research Ethics Committee (CEISH). This process was approved, documented and held on file by the CEISH.

Disclosure

The authors report no conflicts of interest in this work.

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